



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|---------------------------------|------------------------|
| 10/616,227 | 07/10/2003 | Kazuhiko Nagano | Q76484 | 2250 |
| 23373 7590 08/11/2008 SUGHRUE MION, PLLC 2100 PENNSYLVANIA AVENUE, N.W. SUITE 800 WASHINGTON, DC 20037 | | | EXAMINER VAN ROY, TOD THOMAS | |
| | | | ART UNIT 2828 | PAPER NUMBER |
| | | | MAIL DATE 08/11/2008 | DELIVERY MODE PAPER |

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/616,227

Applicant(s)

NAGANO ET AL.

Examiner

TOD T. VAN ROY

Art Unit

2828

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 July 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) 4,5,11 and 15-26 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3,6-10,12-14,27-29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB-08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 07/10/2008 has been entered.

Response to Amendment

The Examiner acknowledges the amending of claims 1 and 12-13.

Response to Arguments

Applicant's arguments filed 07/10/2008 have been fully considered but they are not persuasive.

With respect to claim 1, the Applicant has argued that the lens array of Heidei does not contact the defined "lens setting surface" at a planar portion thereof. The Examiner does not agree.

The Applicant has characterized the contact with the corner of #25 on pg.11 of the Remarks much the same way as the Examiner's position. The front of #25 is a planar surface. If any contact is made with this surface (at the corner or otherwise), it is necessarily contacting a plane. Therefor, since the lens array contacts at least the corner of #25 it must then be in contact the planar portion meeting the updated claim language.

With respect to claims 12 and 13 the Applicant has argued the Examiner has provided no reason why a modification to Heidel would have been obvious.

The Examiner points to the bottom of the rejection of claim 12 wherein a clear motivation statement has been provided.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1 and 6 are rejected under 35 U.S.C. 102(e) as being anticipated by Heidel et al. (US 5212707).

With respect to claim 1, Heidel discloses a laser apparatus comprising: a block (fig.1 #12), a plurality of laser diodes respectively having light emission points and being fixed to said block so that the light emission points are aligned along a direction (fig.1 #10), a collimator lens array integrally formed to contain a plurality of collimator lenses which are arranged along a direction and respectively collimate laser beams emitted from said plurality of laser diodes (fig.1 #22,24 each taught to be a collimating lens, col.6 lines 23-39, so together form a lens array, #24 also made of an array of individual pieces), wherein said block has a lens setting surface which is flat (fig.1 #25, outer

portion of protrusion), perpendicular to optical axes of said plurality of laser diodes (extending perpendicularly in front of the array), and located on a forward side of said plurality of laser diodes at a predetermined distance from said light emission points, and said collimator lens array is fixed to said block so that an end surface of the collimator lens array is in contact with a planar portion of said lens setting surface (fig.1, an end surface of the lens array contacts the setting surface at the intersection (corner) of the inner portion and outer portion of #25 as can be seen in fig.1).

With respect to claim 6, Heidel discloses the diode lasers to be single cavity and have a single light emission point (abs., wherein the emission regions are said to be separate for each device, fig.2 and are of a single cavity).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 12-13, and 27-29 rejected under 35 U.S.C. 103(a) as being unpatentable over Heidel.

With respect to claims 12 and 27-29, Heidel teaches a laser apparatus comprising: a block (fig.1 #12), a plurality of laser diodes respectively having light emission points and being fixed to said block so that the light emission points are aligned along a direction (fig.1 #10), a collimator lens array integrally formed to contain a plurality of collimator lenses which are arranged along a direction and respectively collimate laser beams emitted from said plurality of laser diodes (fig.1 #22,24 each taught to be a collimating lens, col.6 lines 23-39, so together form a lens array, #24 also made of an array of individual pieces), wherein said block has a lens setting surface which is flat (fig.1 #25, outer portion of protrusion), perpendicular to optical axes of said plurality of laser diodes (extending perpendicularly in front of the array), and located on a forward side of said plurality of laser diodes at a predetermined distance from said light emission points, and said collimator lens array is fixed to said block so that an end surface of the collimator lens array is in contact with said lens setting surface (fig.1, an end surface of the lens array contacts the setting surface at the intersection (corner) of the inner portion and outer portion of #25 as can be seen in fig.1). Heidel does not teach adjusting a position of each of said plurality of laser diodes in a direction parallel to said optical axes based on information obtained by measurement of a focal length of one of the plurality of collimator lenses corresponding to each of said plurality of laser diodes, and fixing each of the plurality of laser diodes at the adjusted position, or adjusting

Art Unit: 2828

positions of the lens along a planar surface the reference surface. It would have been obvious to one of ordinary skill in the art at the time of the invention to adjust the distance of the light source away from the lens based on the focal length as this will maximize the light captured and transmitted by the lens, as is well known and widely practiced in all optical fields. (Heidel additionally teaches making focal length adjustments when constructing the 2D array embodiment.)

Claim 13 is rejected for the same reasons as given in the rejection to claim 1, as well as claim 12.

Claims 2-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heidel in view of Chiappetta et al. (US 6724791).

With respect to claims 2 and 3, Heidel teaches the laser apparatus as outlined in the rejection to claim 1, but does not teach the flatness of the block on which the diodes and lenses are fixed to have a flatness not greater than 0.5 μm . Chiappetta teaches a laser apparatus wherein it is taught that heat transfer is maximized when the largest amount of surface area of the object and heat sink are in contact, namely when they are both flat (col.7 lines 9-34). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the laser apparatus of Heidel with the flat contact area as taught by Chiappetta, to maximize heat transfer to the heat sink for both the lenses and the diodes, and additionally to make the flatness not greater than 0.5 μm as it has been found to be within the general skill of a worker in the art to discover the optimum or workable ranges through routine experimentation (i.e. optimizing the degree

of flatness, as having been taught by Chiappetta; see MPEP 2144.05 II A - In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955)).

Claims 7-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heidel in view of Andrews (US 5640188), and further in view of Andrews et al. (US 5432535) and Kuniyasu et al. (US 2002/0018499).

With respect to claims 7, and 9, Heidel teaches the laser apparatus as outlined in the rejection to claim 1, including the block to be a heat dissipation block. Heidel does not teach the lasers to be mounted on a plurality of submounts which is in turn mounted on the heat dissipation block, or that the semiconductor lasers are mounted on the submounts via AuSn and a metallization layer, and are of a nitride compound. Andrews '188 teaches a plurality of semiconductor lasers mounted on a plurality of submounts (fig.4 #'s 86), said submounts being themselves mounted on a copper heat dissipation block (fig.4 #64, taught to be made of one piece, col.5-6 lines 65-7). Andrews '535 teaches semiconductor laser submounts to be made of AlN (col.5 lines 16-19) and to be at least 200um thick (col.10 line 22). Kuniyasu further teaches the use of GaN based material ([0008]) to be flip chip mounted (fig.28, heat sink attached at top surface), and to be bonded to a heat sink through a metallization layer (fig.32 #258) and AuSn solder (fig.32 #231). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the laser light source of Heidel with the submounts and copper heat sink of Andrews '188 to provide heat dissipation (col.6 line 6) and reduce thermal cross talk between adjacent devices (col.7 lines 3-4), and the AlN material and

thickness of the submounts of Andrews '535 as the material provides for proper support and heat conduction away from the devices (col.5 lines 4-26), and additionally incorporate the GaN material and mounting techniques of Kuniyasu to generate 400um wavelengths for use with photosensitive material ([0008]), remove excess heat from the active region ([0220]), and use bonding material that will not deteriorate while using additional heat removal techniques such as water flow ([0166]).

With respect to claim 8, Heidel, Andrews, and Kuniyasu teach the laser light source as outlined in the rejection to claim 7 above, and Kuniyasu additionally teaches the GaN device to have a light emission region (fig.32 #249), and said metallization layer and said AuSn solder are separated by a groove (fig.32 #273) arranged below the light emission layer. It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the groove of Kuniyasu into the laser light source in order to provide additional cooling for the device active regions by placing the cooling mechanism closer to the active region ([0232-233]).

With respect to claim 10, Heidel, Andrews, and Kuniyasu teach the laser light source as outlined in the rejection to claim 1 above, recalling Kuniyasu's use of AuSn solder for the chip to mount connection, and Andrews '535 further teaches the submounts to be soldered to the heat dissipation block (col.5 lines 56-58). Andrews does not teach the solder to be of AuSn. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the laser light source with the AuSn solder used to solder the submount to the heat dissipation block as the benefits of AuSn solder have been laid out by Kuniyasu as outlined in the rejection to claim 7.

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Heidel in view of Andrews '188 and further in view of Kuniyasu.

With respect to claim 14, Heidel teaches the laser apparatus as outlined in the rejection to claim 13, including the diodes to be aligned and the block to be a heat dissipation block, but does not teach the diodes to be mounted junction side down on submounts. Andrews '188 teaches a plurality of semiconductor lasers mounted on a plurality of submounts (fig.4 #'s 86). Kuniyasu further teaches the use of GaN based diode lasers ([0008]) to be flip chip mounted (fig.28, heat sink attached at top surface). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the laser light source of Heidel with the submounts of Andrews '188 to provide heat dissipation (col.6 line 6) and reduce thermal cross talk between adjacent devices (col.7 lines 3-4), as well as the mounting techniques of Kuniyasu to remove excess heat from the active region ([0220]).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TOD T. VAN ROY whose telephone number is (571)272-8447. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun Harvey can be reached on (571)272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2828

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/TVR/

/Minsun Harvey/
Supervisory Patent Examiner, Art Unit 2828